M4•9 STERILIZER QUICK REFERENCE SHEET

When calling for service please have the following information available:

• Model Number

• Serial Number

• Description of problem

PHONE NUMBER ... 1-800-MIDMARK (643-6275)

- **PARTS ORDERING {ext. 8911}**
- **MEDICAL TECH SERVICE {ext. 8912}**
- **DENTAL TECH SERVICE {ext. 8913}**
- **STERILIZER TECH SERVICE {ext. 8925}**

SERVICE DEPT. FAX NUMBER 1-877-249-1793

SPECIFICATIONS

CAPACITIES

Water Reservoir .....1.5 gallon (9.5 Liters) to Full mark.
*Usable volume is 1.0 gallon (3.8 liters)
Max. Load per Tray.... 3 dental pieces or 30 instruments
Max. Chamber Load.....3 trays (9 dental pieces or 90 instruments)

ELECTRICAL REQUIREMENTS

115 VAC Units .....110 - 120 VAC, 50 - 60 Hz 15 Amp, Single Phase
230 VAC Units .....220 - 240 VAC, 50 - 60 Hz 10 Amp, Single Phase

A separate (dedicated) circuit is recommended for this sterilizer. The sterilizer ***should not*** be connected to an electrical circuit with other appliances or equipment unless the circuit is rated for the additional load.

POWER CONSUMPTION

115 VAC Units ..... 1550 Watts, 12 Amps @ 120 VAC
230 VAC Units ..... 1550 Watts, 6.5 Amps @ 240 VAC

FUSE RATING

115 VAC Units ..... (Main L1) Fast Acting,15 A, 600V (P.C. Board F1, F2) 1.6 A, 250 V, Slo-blo
230 VAC Units ....(Main Fuse) Fast Acting, 8 Amp, 600V (P.C. Board F1, F2) 1.6 A, 250 V, Slo-blo

CHAMBER PRESSURE

Operating.....27 - 31 PSI (186 - 215 kPa)
Minimum Pressure @ Door Release..... 0.7 PSI (5 kPa)
Maximum Pressure before Safety Valve opens... 40 PSI (276 kPa)

CHAMBER TEMPERATURE (Operating)

Unwrapped..... 270 - 275°F (132-135°C)
Wrapped ..... 270 - 275°F (132-135°C)
O/L Temp. settings ..... Opens 475°F (246°C) ± 25°F
Closes 395°F (121°C) ± 25°F
Fan Thermostat settings*.....Closes 130°F (54°C)
(*Ambient Temp. outside Chamber) Opens 101°F (38°C)

SW2 DIP SWITCH

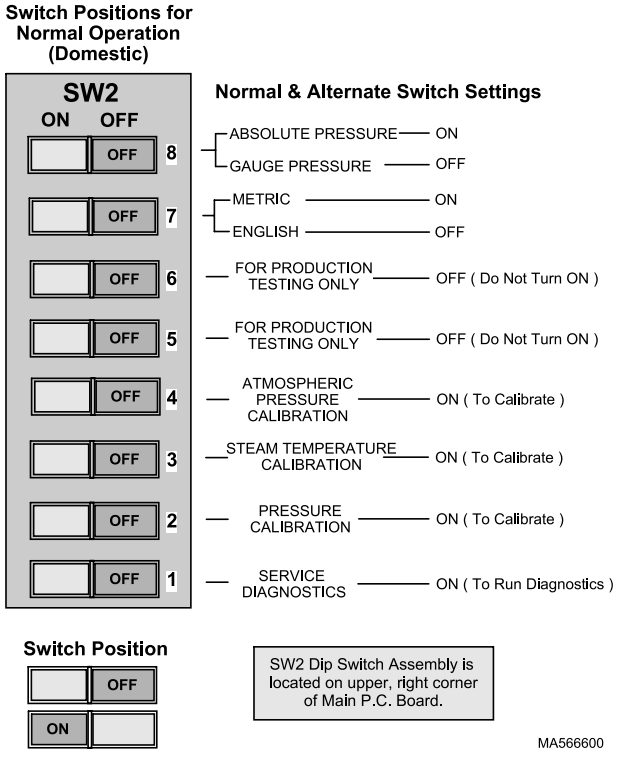
Switch Positions for Normal Operation (Domestic)
SW2
ON OFF
OFF 8
OFF 7
OFF 6
OFF 5
OFF 4
OFF 3
OFF 2
OFF 1
Normal & Alternate Switch Settings
ABSOLUTE PRESSURE — ON
GAUGE PRESSURE — OFF
METRIC — ON
ENGLISH — OFF
FOR PRODUCTION TESTING ONLY — OFF (Do Not Turn ON)
FOR PRODUCTION TESTING ONLY — OFF (Do Not Turn ON)
ATMOSPHERIC PRESSURE CALIBRATION — ON (To Calibrate)
STEAM TEMPERATURE CALIBRATION — ON (To Calibrate)
PRESSURE CALIBRATION — ON (To Calibrate)
SERVICE DIAGNOSTICS — ON (To Run Diagnostics)
Switch Position
OFF
ON
SW2 Dip Switch Assembly is located on upper, right corner of Main P.C. Board.
MA566600

Figure 1

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004-0389-00 Rev. C (10/02)

ERROR CODES

Digit	First Digit = SYSTEM*	Second Digit = SYMPTOM**	Third Digit = MODE***
0	General System (0)	*(blank) (0)*	Power Up (0)
1	Stop Key Pressed (1)	Power Loss (1)	Select (1)
2	Water Level Sensor (2)	Closed (2)	Fill (2)
3	Door Interlock Switch (3)	Low (3)	Heatup (3)
4	Aux. (Trough) Temp.Probe (4)	High (4)	Sterilization (4)
5	Steam (Side) Temp. Probe (5)	Regulation Error (5)	Vent (5)
6	Pressure Sensor (6)	Hardware (6)	Door Open (6)
7		Over Limit (7)	Dry (7)
8		Open (8)	
9	T-stat High [O/L] Limit(s) (9)		

Example:

C987

C = Code

9 = Combined Hi Limit

8 = Open

7 = Dry Mode

***SYSTEM:** Designates which input system caught the error. (General System [0]; Pressure Sensor [6]; High Limit [9]; etc.)

****SYMPTOM:** Represents the error's symptom. (Power Loss [1}; Over Limit [7]; Open [8]; etc.)

*****MODE:** Mode that the error occurred in. (Select [1]; Heatup [3]; Vent [5]; etc.)

NO POWER
- Is unit plugged in?
- Check voltage at outlet.
- Is L1 (Main) fuse open?
- Check Transformer.

HAS POWER, NO DISPLAY OR TOUCH PAD
- Check J12 harness & plug (Main PCB).
- Check Transformer.
- Check F1, F2 fuses (Main PCB).
- Check harness (J1 Main PCB to J3 Display PCB).
- Display PCB is malfunctioning.
- Main PCB is malfunctioning.

HAS POWER, NO DISPLAY
- Check J2 harness & plug (Display PCB)

CHAMBER VENTING BEFORE FILL
- Calibrate Atmospheric Pressure.

INSTRUMENTS NOT DRYING
- Sterilizer Overloaded.
- Door fully opened before completion of Dry Cycle.
- Sterilizer not level.
- Filter screen in chamber clogged.
- Vent Valve malfunctioning or lines restricted.
- Auxiliary or Steam Heater(s) malfunctioning.
- Upper and/or Lower Limit Switches malfunctioning.
- Solid State Relay (SSR) malfunctioning.
- Main Relay malfunctioning.

BIOLOGICAL STRIPS SHOW UNSTERILE
- Sterilizer Overloaded.
- Improper Operation by end user.
- Instrument trays not made for sterilizer or operation.
- Wrong type of Biological strips being used.
- Chemical indicator has been in contact with water.
- Strips stored in damp / hot environment.

PERFORM MONTHLY MAINTENANCE
- Cycle count reached multiple of 140 and indicates time to perform Monthly Maintenance.

PERFORM WEEKLY MAINTENANCE
- Cycle count reached multiple of 40 and indicates time to perform Weekly Maintenance.

PRINTER DOES NOT PRINT (OPTIONAL)
- Printer out of paper.
- Cartridge ribbon is dry.
- Printer wire harness disconnected.
- Printer wire harness has broken or open leads.
- Printer Malfunctioning.

C010 C060
- Supply Power interrupted due to storm, etc.

C102 C103 C104 C105 C106
- Operator pressed STOP button.

C232
- Reservoir water low.
- Filter screen in chamber clogged.
- Water Fill Level Sensor dirty.
- Fill Valve restricted or has open coil.
- Check J6 harness & plug (Main PCB).
- Main PCB malfunctioning.

C382 C383 C384 C385
- Door open during cycle.
- Check Door Interlock Switch for proper operation.

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C431 **C437**
- Door left open & tray rack not in position.
- Condensing coil outlet is beneath reservoir water level.
- Solid State Relay (SSR) malfunctioning.
- Auxiliary or Steam Heater(s) malfunctioning.
- Check Auxiliary Temp. Sensor (J3 on Main PCB).
- Main PCB malfunctioning.

C461 **C467**
- Check Auxiliary Temp. Sensor (J3 on Main PCB).
- Main PCB malfunctioning.

C470
- Check previous 5 Error Codes (Service Diagnostics).
- Auxiliary Temp. Sensor malfunctioning.
- Auxiliary (Upper) High Limit is weak.
- Main PCB malfunctioning.

C471 **C472** **C473** **C474** **C475** **C476** **C477**
- Sterilizer not level.
- Water Fill Level Sensor dirty.
- Air or Vent Valve malfunctioning.
- Check Auxiliary Temp. Sensor (J3 on Main PCB).
- Solid State Relay (SSR) malfunctioning.
- Main PCB malfunctioning.

C533
- Steam Heater malfunctioning.
- Steam leakage from chamber.
- Solid State Relay (SSR) malfunctioning.
- Main Relay malfunctioning.
- Steam Temp. Sensor malfunctioning.
- Main PCB malfunctioning.

C544
- Check Vent or Fill Valves leaking water from chamber.
- Steam Temp. Sensor malfunctioning.
- Main PCB malfunctioning.

C554
- Unit not leveled correctly (See I/O Manual).
- Chamber overloaded.
- Steam leakage from chamber.
- Temperature Sensor out of calibration.
- Pressure Transducer out of calibration.
- Air Valve malfunctioning.
- Pressure Transducer malfunctioning.
- Steam Temp. Sensor malfunctioning.
- Main PCB malfunctioning.

C560
- Check previous 5 Error Codes (Service Diagnostics)
- Steam Temp. Sensor malfunctioning.
- Main PCB malfunctioning.

C561 **C562** **C563** **C564** **C565** **C566** **C567**
- Steam Temp. Sensor malfunctioning.
- Main PCB malfunctioning.

C570
- Check previous 5 Error Codes (Service Diagnostics)
- Steam Temp. Sensor malfunctioning.
- Main PCB malfunctioning.

C571 **C572**
- Steam Temp. Sensor malfunctioning.
- Solid State Relay (SSR) malfunctioning.
- Main Relay malfunctioning.
- Main PCB malfunctioning.

C573 **C574**
- Check previous Error Codes. Run Service Diagnostics and check Steam Temp.
- Steam Temp. Sensor malfunctioning.
- Solid State Relay (SSR) malfunctioning.
- Main Relay malfunctioning.
- Pressure lines to Transducer restricted / clogged.
- Pressure Transducer malfunctioning.
- Tray rack shorting out Water Level Sensor.
- Main PCB malfunctioning.

C575
- Filter screen in chamber clogged.
- Vent Valve malfunctioning or lines restricted.
- Steam Temp. Sensor malfunctioning.
- Solid State Relay (SSR) malfunctioning.
- Main Relay malfunctioning.
- Main PCB malfunctioning.

C576 **C577**
- Door not opening (C577).
- Steam Temp. Sensor malfunctioning.
- Solid State Relay (SSR) malfunctioning.
- Main Relay malfunctioning.
- Main PCB malfunctioning.

C633
- Door Gasket leaking.
- Pressure Relief, Air, Vent Valve or fittings leaking.
- Steam Heater malfunctioning.
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

C642 **C645**
- Air or Vent Valve malfunctioning.
- Calibrate Atmospheric Pressure.
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

C647
- Door not fully opening.
- Filter screen in chamber clogged.
- Vent Valve malfunctioning or lines restricted.
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

C660
- Check previous 5 Error Codes (Service Diagnostics)
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

C661 **C662** **C663** **C664** **C665** **C666** **C667**
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

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C670
- Check previous 5 Error Codes (Service Diagnostics)
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Vent Valve malfunctioning or lines restricted.
- Main PCB malfunctioning.

C671 C672
- Air or Vent Valve malfunctioning.
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

C673 C674
- Air Valve malfunctioning.
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Temperature Sensor out of calibration.
- Steam Temp. Sensor malfunctioning.
- Solid State Relay (SSR) malfunctioning. (C674)
- Main PCB malfunctioning.

C675 C676 C677
- Door not fully opening (C677).
- Filter screen in chamber clogged.
- Vent Valve malfunctioning or lines restricted.
- Pressure Transducer out of calibration.
- Pressure Transducer malfunctioning.
- Main PCB malfunctioning.

C980
- Check previous 5 Error Codes (Service Diagnostics).
- Condensing coil outlet is beneath reservoir water level.
- Upper and/or Lower Limit Switches malfunctioning.
- Wire connections broken or loose on Limit Switch(es).
- Insulation pad deteriorated between Limit Switch & chamber surface.
- Temperature surpassing 475°F. Run Service Diagnostic to determine probable cause.
- Main PCB malfunctioning.

C981 C982 C983 C984 C985 C986 C987
- Condensing coil outlet is beneath reservoir water level (C987).
- Upper and/or Lower Limit Switches malfunctioning.
- Wire connections broken or loose on Limit Switch(es).
- Insulation pad deteriorated between Limit Switch & chamber surface.
- Temperature surpassing 475°F. Run Service Diagnostic to determine probable cause.
- Main PCB malfunctioning.

SERVICE DIAGNOSTICS

NOTE: *Refer to Service Manual for complete explanations of each diagnostics test procedures.*

Place **SW2 Switch #1** in **ON** position to activate Service Diagnostics Mode.

- Press **STOP** to Display **last 5 Error Codes**.
- **Unplug / Replug** unit then continue.

- Press **START** to go into Diagnostics:
- Press **UNWRAPPED** (Audible Beep if operable).
- Press **WRAPPED** (Audible Beep if operable).
- **AIR VALVE TEST** (Press START to Toggle, STOP for next test).
- **VENT VALVE TEST** (Press START to Toggle, STOP for next test).
- **FILL VALVE TEST** (Press START to Toggle*****, STOP for next test).

***Note:** When ON, water will enter chamber. Do not allow water to overflow chamber.*

- **DOOR OPEN TEST** (Press START to Operate, STOP for next test).
- **MAIN RELAY TEST** (Press START to Toggle, STOP for next test).
- **STEAM HEATER TEST** (Press START to toggle Lower Heater ON***** / OFF, STOP for next test).
- **AUXILIARY HEATER TEST** (Press START to turn Upper Heater ON***** / OFF, STOP for next test).

***Note:** Heater is energized for 15 seconds maximum when START button is pressed. Do not restart heater cycle more then twice before allowing unit to cool.*

- **STEAM AUX PRESS TEST** (Checks Temp. Sensors and Pressure. Should sensor be open, shorted, or disconnected a 32°F or 0°C reading will display.)

- **END DIAGNOSTIC TEST** (Unplug unit, place SW2 Switch #1 in OFF position, install panel(s) and plug unit back in.)

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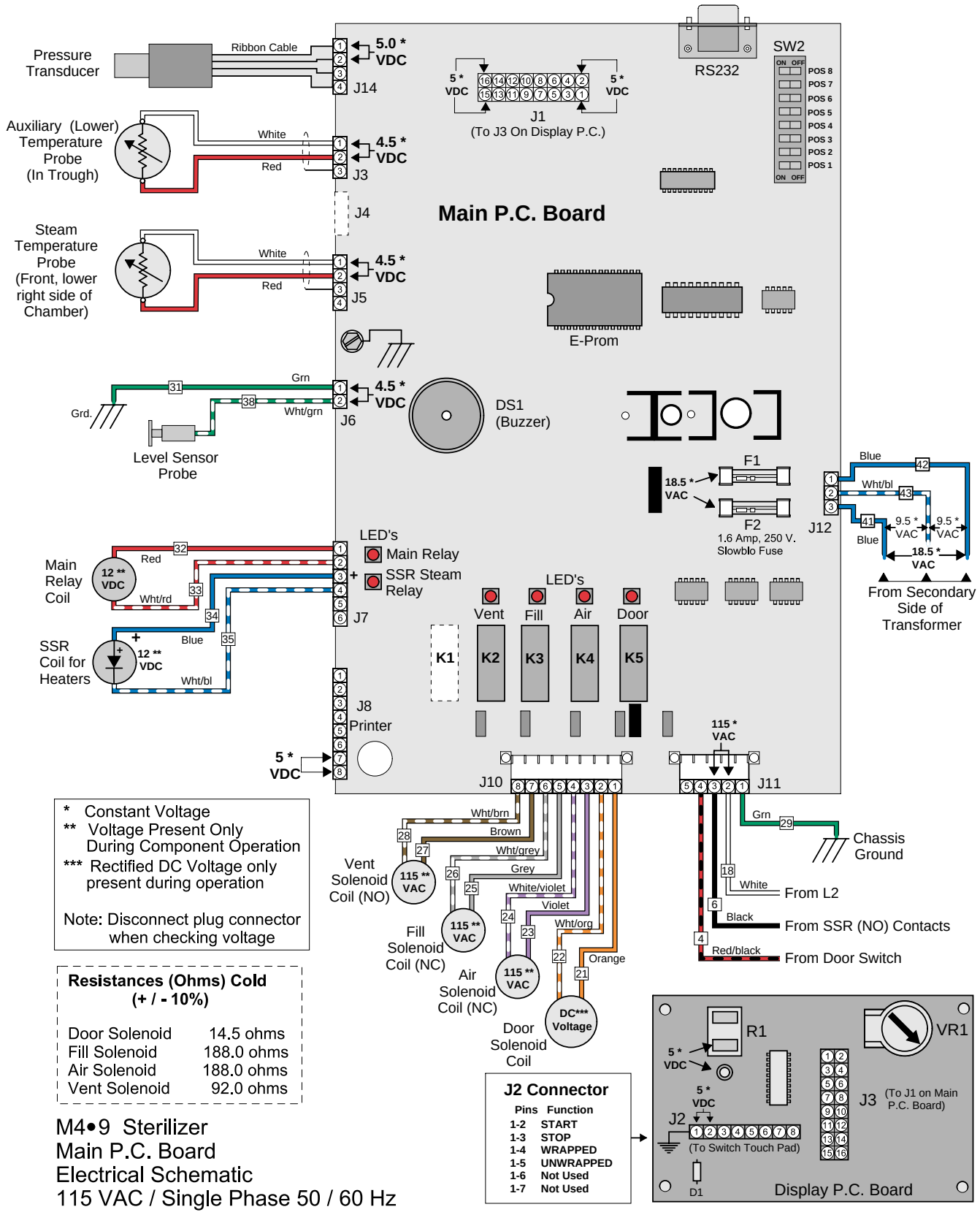
MAIN P.C. BOARD SCHEMATIC



* Constant Voltage
** Voltage Present Only During Component Operation
*** Rectified DC Voltage only present during operation

Note: Disconnect plug connector when checking voltage

Resistances (Ohms) Cold (+ / - 10%)

Door Solenoid	14.5 ohms
Fill Solenoid	188.0 ohms
Air Solenoid	188.0 ohms
Vent Solenoid	92.0 ohms

J2 Connector

Pins	Function
1-2	START
1-3	STOP
1-4	WRAPPED
1-5	UNWRAPPED
1-6	Not Used
1-7	Not Used

M4•9 Sterilizer
Main P.C. Board
Electrical Schematic
115 VAC / Single Phase 50 / 60 Hz

MA566300

Figure 2

CONTROL CIRCUIT SCHEMATIC

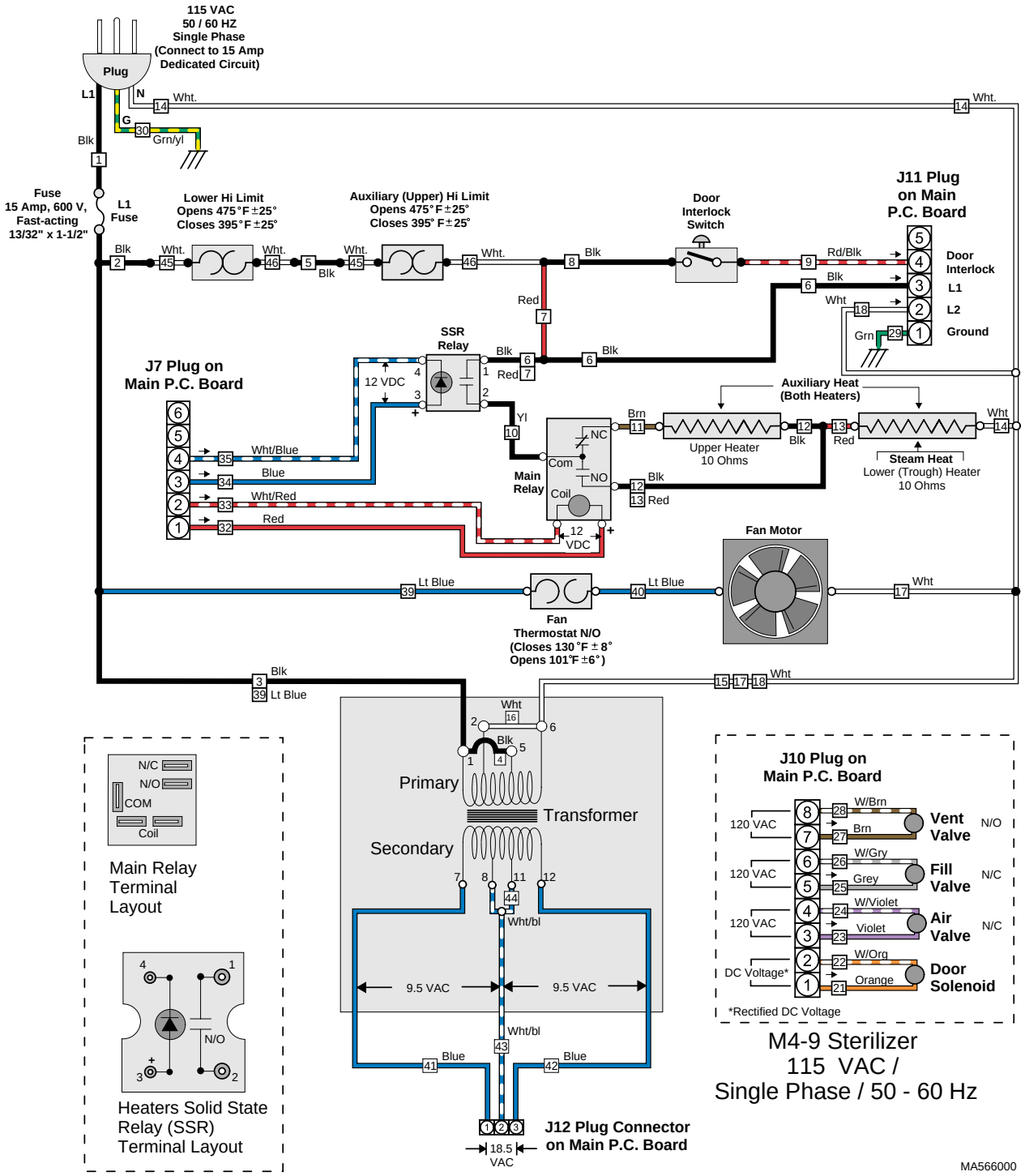


Figure 3

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CALIBRATIONS

NOTE

Tags located on the leads of the Steam Temperature Sensor and Pressure Transducer show the Offset Temperature (Temperature Sensor) and the Pressure Span and Offset (Pressure Transducer). Use these figures for calibrating. *(Refer to the Service Manual for complete calibration instructions)*.

STEAM TEMPERATURE CALIBRATION

- Unplug Unit.
  - Place SW2 Dip Switch #**3** to ON position.
    - Plug in unit.
      - Record the displayed Offset Temp.
        - Press **START**

To change the Steam Offset Temp. use the UNWRAP and WRAP buttons.

UNWRAP Increases reading 1 digit.
WRAP Advances cursor to next digit (0.**0**00).
STOP cancels the enteries.
START saves the enteries.

Display after START is pressed:

STEAM TEMP
CALIBRATION MODE
SUCCESSFUL
UNPLUG / REPLUG UNIT
<UNWRAP> -0.1 C
<WRAPPED> +0.1 C

Display after STOP is pressed:

STEAM TEMP
CALIBRATION MODE
CANCELLED
UNPLUG / REPLUG UNIT

- Unplug Unit.
  - Place SW2 Dip Switch #**3** (Fig. 1)to OFF position.
    - Plug in unit.

PRESSURE CALIBRATION

- Unplug Unit.
  - Place SW2 Dip Switch #**2** (Fig. 1)to ON position.
    - Plug in unit.
      - Record the displayed SPAN and OFFSET
        - Press **START**

To change the Pressure Span use the UNWRAP and WRAP buttons.

UNWRAP Increases reading 1 digit.
WRAP Advances cursor to next digit (0.**0**00).
STOP cancels *ALL* saving data.
START saves *ONLY* the Pressure Span data.

PRESSURE OFFSET is displayed.

To change the Pressure Offset use the UNWRAP and WRAP buttons.

UNWRAP Increases reading 1 digit.
WRAP Advances cursor to next digit (0.**0**00).
STOP cancels *ONLY* saving *Offset* data.
START saves *ONLY* the *Pressure Offset* data.

Display after START is pressed:

PRESSURE
CALIBRATION MODE
SUCCESSFUL
UNPLUG / REPLUG UNIT
SPAN +1.000
OFFSET +0.000 KPA

Display after STOP is pressed:

PRESSURE
CALIBRATION MODE
CANCELLED
UNPLUG / REPLUG UNIT

- Unplug Unit.
  - Place SW2 Dip Switch #2 to OFF position.
    - Plug in unit

ATMOSPHERIC PRESSURE CALIBRATION

- Unplug Unit and open door.
  - Place SW2 Dip Switch #**4** (Fig. 1)to ON position.
    - Plug in unit.

START TO ZERO is displayed.

- Press START.
  - Wait 1 - 2 minutes.
    - Unplug unit.
      - Place SW2 Dip Switch #**4** to OFF position.
        - Plug in unit.

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MAJOR COMPONENTS

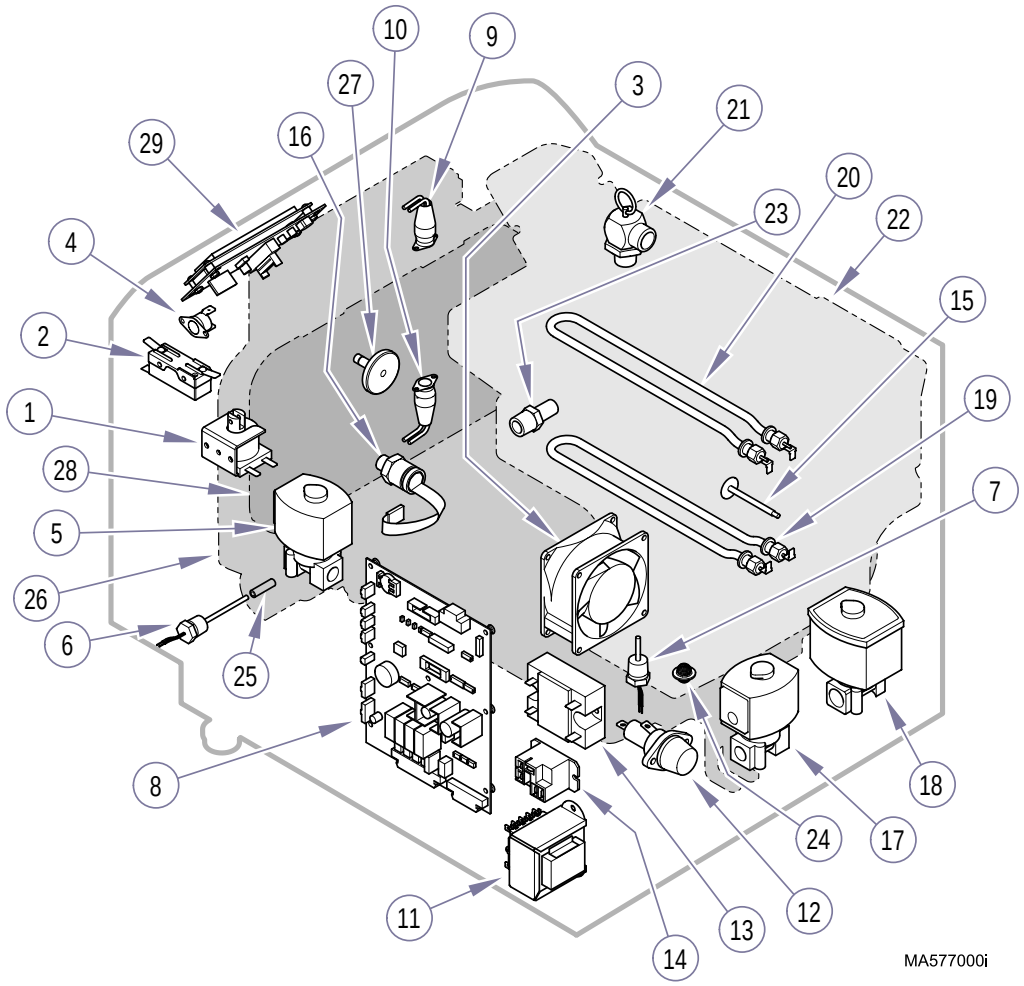

Figure 4

MAJOR COMPONENT LOCATION

1) Door Pulse Solenoid	16) Pressure Transducer
2) Door Interlock Switch	17) Fill Valve
3) Axial Flow Fan	18) Vent Valve
4) Fan Thermostat	19) Steam (Lower) Heating Element
5) Air Valve	20) Upper Heating Element
6) Steam (Side) Temperature Probe	21) Pressure Relief Valve
7) Auxiliary (Lower, Trough) Temperature Probe	22) Reservoir Tank
8) Main Control PC Board	23) Vent Muffler
9) Auxiliary (Upper) Limit Switch	24) Filter Screen
10) Lower Limit Switch	25) Internal Filter Screen
11) Transformer	26) Pressure Vessel
12) Main Fuse (L1)	27) Door Interlock Plunger
13) Solid State Relay (SSR)	28) Door Gasket
14) Main Relay	29) Display / PC Board
15) Water Level Sensor	

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